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Grounding the Curriculum

Learning from Live Projects in Architectural Education

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Abstract: For more than twenty years architects in the UK have advocated the use of 'live' projects in architecture schools as an alternative to the more traditional model of studio learning, but the educational establishment continues to marginalize community-based approaches to learning. Recent debate, focusing on shortcomings of the studio culture in architectural education, has condemned the isolation of students from real world contexts and teaching methods that cultivate values of individualism and competition. As an alternative, many claims have been made about the potential for enhancing student learning by adopting live briefs and involving clients and users in the education of architects. Yet much of the literature remains largely speculative or descriptive and so far has neglected to investigate participatory design processes to determine their precise pedagogic value. The aims of this paper are to examine the nature of learning in student projects outside the studio environment, to locate that learning within a range of categories of learning, and to develop a conceptual structure for further exploration of alternative pedagogies in architectural education. The study is based on evaluations of two participatory design projects carried out with students at Lincoln School of Architecture in the UK. Students' perceptions of the learning they acquired are compared with the intended learning outcomes identified by tutors at the start of the projects, and these are further contrasted with the 'competencies' that are typical outcomes of the traditional curriculum. The findings, which reveal significant contingent and emergent learning in the live projects, are then discussed in relation to recognized theories of learning, such as experiential learning, social constructionism, situated learning and collaborative learning. The objective is to identify an appropriate theoretical framework that may be used to draw attention to the valuable contribution of live project learning in architectural education and support arguments in favour of a more expansive and socially grounded architecture curriculum.

Keywords: Architecture Curriculum, Live Projects, Participatory Design

Introduction

ARCHITECTS IN THE UK have long advocated the use of 'live' projects in architecture schools as an alternative to the more traditional model of studio learning. But the educational establishment continues to marginalize community-based student projects. Many claims have been made about the potential for enhancing student learning by adopting live briefs and involving clients and users in the education of architects. Yet much of the literature remains largely speculative and fails to investigate user-centred or participatory design processes with regards to their precise pedagogic value. The aims of this paper are, first, to situate the growing interest in live projects in architectural education in the context of recent criticism focusing on the shortcomings of studio culture and teaching methods that cultivate values of individualism and competition. A second aim is to highlight the nature of learning in projects outside the studio environment through a qualitative study of student learning in two participatory design projects undertaken at the Lincoln School of Architecture. The paper further proposes to locate the findings of this study within a

range of categories of learning with the aim of developing a conceptual structure for further exploration of alternative pedagogies in architectural education. The objective is to identify an appropriate theoretical framework that may be used to draw attention to the valuable contribution of live project learning in architectural education and support arguments in favour of a more expansive and socially grounded architecture curriculum.

The Critique of Studio Culture

The central pedagogic tool in contemporary architectural education is the design project, typically undertaken in the 'hothouse' environment of the architecture studio. Students are given a brief for a building, are guided through a staged sequence of actions by a tutor in one-to-one tutorials over the drawing board and, subsequently, present their solutions to a 'jury' of tutors and visiting practitioners. For some, the design studio offers a uniquely productive and stimulating learning experience. Advocates of problem-based learning claim the design process itself provides an ideal focus for integrating various disciplinary concerns (Maitland, 1991: 249). Donald Schön



hailed the architectural design studio as the optimal environment for the enactment of a 'reflective practicum' and the acquisition of 'professional artistry'. According to Schön the 'laboratory' of the architecture studio, with its focus on helping students find "the artistry of thinking like an architect", provides a new paradigm for professional education (Schön 1987: 82).

But in recent years numerous authors have critically examined the dominant assumptions and practices underpinning architectural education. For some the rituals involved in the architectural design studio are merely a "process of professional initiation", preparing students for membership in the architectural community, not an effective paradigm for learning (Crisson and Lubbock, 1994: 167). Instead of viewing architectural education as the site of unique pedagogic practices, one author claims it is really about "adjusting the value systems of individuals to match those of the architectural profession" (Parnell, 2002:63).

Stevens argues that architectural education is concerned primarily with socializing students into 'architectural culture' (Stevens, 1998). He believes 'architectural culture' is acquired by maintaining a number of hierarchies, the most important of which is the student/tutor relationship in which tutors strive to control the studio learning environment. Cuff argues that the student/tutor relationship creates an emphasis on individuality aimed at producing gifted designers or star architects (Cuff, 1991). Gurel and Basa maintain that in confirming the authority of the tutor and the design jury as the locus of architectural knowledge, the process of learning is devalued while graphical presentation acquires an inflated significance (Gurel and Basa, 2004; see also J. Harris, 2001). In the traditional studio environment "priority is given to 'design as product' rather than to design as a dynamic and interactive process" (Nicol and Pilling, 2000: 8; 10).

The student/tutor relationship also leads to student dependency according to some authors. Contrary to Schön's claims, Nicol and Pilling believe "few studio programmes are consciously structured to lead students from dependence to independence in learning", and there are insufficient opportunities for students to reflect on their own learning (Nicol and Pilling, 2000: 11-12). The code of behaviour established in the studio demands that students should not question or challenge, leading to a negation of dialogue (Willenbrock, 1991: 107). Fundamental assumptions or values are accepted as 'given' and "mystery is taken to be mastery" (Dutton, 1991: 173). Thus, the traditional studio encourages the acquisition of esoteric professional discourse and poor communication skills which are at odds with the requirements of professional practice (Sara, 2002: 121). This leads

to a gap between the values of society at large and those being inculcated in the profession.

Architectural education is seen by many as an isolated, artificially controlled indoor activity that prioritises theory over experience and leads to the production of a "precious" and "uncontaminated" object (Jarrett 2000, p.59-60). In a study of student and tutor perceptions of the one-to-one tutorial situation, Webster convincingly demonstrates that tutorial practices rarely result in high-quality student learning; in many cases the experience for students is de-motivating and frustrating (Webster, 2004). Yet authors reluctantly agree that the integrated design project, conducted within the "hypothetical realm" of the studio, remains the most important vehicle for learning in architectural education (Willenbrock, 1991). The established educational system continues to support an individualist approach and presents a formidable barrier to change (Parnell, 2002).

The 'Live' Project Alternative

One alternative, aimed at enhancing student learning, is the adoption of 'live' projects in the education of built environment professionals. For the purposes of this paper a live project is one that exposes students to 'real life' situations, usually including team-work and interaction with clients, community groups or building users. Some believe the best way to develop professional competencies is to embed learning processes in authentic learning tasks and social contexts (Nichol and Pilling, 2000: 19). Live projects necessarily place increased emphasis on the process, which is determined by external rather than academic factors. Arguing for the inclusion in urban planning curricula of more cooperative, small-group learning experiences, Kotval maintains they offer "opportunities to combine discipline-specific subject skills with practical transferable skills..." (Kotval, 2003: 303). Parnell claims alternative pedagogies will encourage greater respect for users' needs and aspirations, develop empathy and co-operation among students, and raise awareness of the variety of skills needed in professional situations (Parnell, 2002: 69). Although one author contends that "most students experience a live project and have access to real clients and users at some stage in their time at university" (Fisher, 2000: 139), there is a shortage of serious research on these projects and their pedagogic value.

Several published case studies describe community based projects involving students, but few attempt a meaningful analysis other than highlighting perceived learning outcomes derived from project evaluations. One example is the live project described by Sara offered to second year architecture students at Sheffield University School of Architecture. As part of

the Clients and Users in Design Education (CUDE) initiative, the project was based on a belief that "if future architects are to be responsive to the needs of society then there is a need for two-way learning between architecture students and the community" (Sara, 2000: 77). Following a positive response from student evaluations, tutors observed that competition was reduced as students experienced the design process as a team activity. They were more willing to share information and learn from each other and they learned the importance of adjusting their presentation practices when communicating with non-architects. The author concludes that "live projects have the potential to enhance students' learning experience and boost their enthusiasm and motivation" (Sara, 2000: 83).

McAdam and Gueterbock similarly report on a live project undertaken by students at London Metropolitan University involving the collaborative design and building of two youth shelters in Clerkenwell in the London Borough of Islington. The tutors felt this was an unusually complex project despite its small scale in that students had to engage with a wide range of participant groups while also designing and constructing the shelters themselves. In the published account of the project no specific learning objectives are mentioned beyond the general aim of "placing social values high on the agenda of new urban professionals" (Fluid, 2005: 260). However, one student briefly commented on the learning experience by observing that all the skills he had acquired throughout his education were called upon in this one project.

Romice and Uzzell go much further in explaining the precise learning they expected students to acquire in a collaborative community design project offered to architecture students at the University of Strathclyde and environmental psychology students at the University of Surrey (Romice and Uzzell, 2005). The project focused on proposals for environmental improvements to an inner city neighbourhood in Glasgow, which required architecture students to consult with client and community groups. Psychology students acted as consultants, suggesting new methodologies for environmental investigation and analysis and interpreting data gathered by the architecture students. The tutors had two broad ambitions in undertaking the project. One was to expose students to a practical view of their respective professions. A second was to build on professional co-operation to encourage other forms of knowledge to strengthen the architects' design decisions. The underpinning pedagogic framework for the project was the theory of action learning (Romice and Uzzell, 2005: 80).

Action learning is essentially 'learning by doing' and is concerned with the workplace as an alternative

learning environment. Action learning is a 'real time' learning process in which people develop solutions to real problems, implement them and evaluate their impact. Groups of people work together in an action learning 'set' to support individual members as they work on real problems and learn from reflection on their practice (Jarvis, Holford and Griffin, 2003, p.138). Romice and Uzzell call this a 'partnership in learning' and claim that action learning "provides a well-tried method of accelerating learning which enables people to handle difficult situations more effectively." Yet they offer no evidence for either an increased rate of student learning or enhanced effectiveness as a result of undertaking the live project (Romice and Uzzell, 2005:80).

In a final example of the introduction of an alternative pedagogy in built environment education, Marilyn Higgins describes a project in which town planning students from Heriot-Watt University worked with local people in Fife, Scotland to create an urban design strategy. In addition to developing the students' creative urban design skills, an overall aim of the project was to promote social entrepreneurship. The project's core pedagogic focus was experiential learning, which Higgins equates with 'learning by doing' (Higgins, 2005: 66). Clear learning outcomes were established in the project brief and student feedback was gathered on anonymous evaluations forms. The tutor reports unusually high evaluation scores and concludes that "many different learning outcomes can be covered explicitly by live projects, including transferable skills such as creative thinking, teamwork, oral communication and negotiation" (Higgins, 2005: 70). These may be outcomes difficult to achieve in any other way.

Jarvis, Holford and Griffin refer to experiential learning as the 'new orthodoxy' in education, but point out that all learning is experiential so the term experiential is superfluous. However, they acknowledge its common usage as a deliberately planned learning process in which individuals encounter the external world (Jarvis, Holford and Griffin, 2003: 67). This process is associated particularly with Kolb who defined experiential education as "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984:38). His frequently cited model of the experiential learning cycle begins with a concrete experience followed by a period of internalized reflection leading to the formation of abstract concepts which then prompt active experimentation and result in further experience. Experiential learning is considered a psychological constructivist theory because, although the learner experiences a situation as a 'whole person', with cognitive, physical and emotional dimensions, learning is essentially constructed as an internal and individual process.

This hints at a fundamental problem with the studies presented above. In many cases data on student learning was collected from standard module feedback forms typically used in UK higher education. Students are asked to score questions or indicators on a scale of 1 to 5 and then add optional comments. Questions are either related to learning outcomes specified in advance by course tutors or to generic level indicators. Writing about experiential learning in built environment education, Harris argues that it is particularly important to formulate precise learning outcomes since they will “help students to navigate through what is typically a rather unstructured learning environment” (N. Harris, 2004:5). Yet it is doubtful that evaluation questionnaires can reveal anything useful about the nature of student learning in live projects. In fact, it is possible they may limit the student’s awareness of learning actually achieved by suggesting what they should have learned.

Several problems with the use of learning outcomes have been identified. Hussey and Smith argue that it is a mistake to believe that learning outcomes can be framed in advance to specify precisely what students will learn because most teaching and learning is ambiguous and uncertain (Hussey and Smith, 2003: 359). Not only will students and tutors differ in their perceptions of a learning situation but, more importantly, students’ perceptions of a learning task will inevitably influence the learning they achieve. As Ramsden says, “It is possible to generate specific learning environments, but not to predict how learners will react because the learner will react to the environment they perceive, which is not necessarily the environment the tutor defined” (Ramsden quoted in Robotham, 2004: 229). So, according to Robotham, quantitative measures such as questionnaires are spurious because they “do not consider the individual subjective component of learning” (Robotham, 2004:232).

Furthermore, too much emphasis on pre-determined learning outcomes may inhibit unforeseen or unplanned learning that some educators believe is the most valuable feature of higher education. Hussey and Smith point out that not all learning outcomes are intended; unpredictable ‘learning moments’ may occur which provide opportunities for ‘emergent’ learning that may be just as desirable as planned outcomes. They stress that “the greater the students’ involvement in and with the learning, the greater the possibility of different learning outcomes emerging” (Hussey and Smith, 2003: 362.). Given that in ‘live’ student projects the control of learning shifts from tutors to students, it seems that unintended or emergent learning would be an inevitable outcome. Thus, in experiential learning situations too close an adherence to prescribed learning outcomes, even if they

have been framed broadly to include a range of transferable skills, may actually stifle the possibilities for learning.

Learning in ‘Live’ Projects: A Research Study

Live projects have underpinned the curriculum at Lincoln School of Architecture for many years. Recently, students had the opportunity to participate in two projects requiring extensive group work and interaction with real clients and community groups. In ‘The Club’s The Hub’ project, five postgraduate students worked alongside tutors to produce a masterplan for the Sincil Bank area of the city of Lincoln, the location of the city’s football stadium. Students held regular meetings with local partnership groups, analysed responses from questionnaires distributed to area residents and held two well-attended public exhibitions. Based on feedback received, they produced several design options for redeveloping the area. The second project was located in the cathedral city of Ely. Students and staff were asked by the local council to improve under-used and unsightly public spaces around Steeple Row, adjacent to the cathedral. A group of eight students came up with proposals for the area, including a new visitor centre, café and landscaping to enhance the cathedral and bishop’s palace and to create a physical link with the high street and market place.

Both student groups were mixed in terms of gender, nationality, and age. Only one student had previously participated in a live project in an academic context. In both projects learning outcomes were those published for design project units in course documentation. These had been framed broadly and flexibly for application to a wide variety of student projects. Standard questionnaires were used to evaluate the projects, as required by the university, but the results are not used in the present study.

To overcome shortcomings highlighted in previous studies, a qualitative methodology was used to draw out distinctive characteristics of the student learning experience in the two projects. Data was collected in two ways. First, the authors attended critiques and assessments with the students to obtain initial impressions. Second, one of the authors who had not been directly involved in the projects conducted semi-structured interviews with the students. Questions were concerned with their prior expectations, the most significant thing learned, new knowledge and skills acquired, and perceived differences between learning in the ‘live’ projects compared with previous projects. Both authors independently identified themes from the data and these were triangulated with observations made at assessments and with available literature. In classifying themes, examples

of conflicting opinion were noted along with factors that may have influenced the students' interpretation of their learning experience. The findings presented below are supported by quotes to reflect the voices of the participants.

There was a significant correlation in the prior expectations of all the interviewees. Responses indicate that expectations were focused on practical rather than abstract learning: "I expected to learn practical things; nothing hypothetical. Practicality was a key concern"; "To understand the practicality of the field, the non academic issues that affect feasibility"; and "I expected to learn about dealing with the public at large and also with authorities." The students also generally agreed on the specific skills they thought the project required. A key theme was skills required for successful group interaction and communication. They highlighted: "Good communication skills, patience and understanding"; "The ability to deal with the general public with confidence, to overcome initial shyness"; and "Good team working skills..."

When asked what previously acquired knowledge they brought to the project, many respondents stressed traditional studio skills, such as design or CAD skills. "Drawing and model making skills were helpful in the project" was a typical comment, although another student did say, "I had previous knowledge of conducting surveys." Only one mentioned other personal skills that had a direct bearing on group work and interaction with clients: "...analytical skills and marketing knowledge [were] an asset in dealing with a situation involving multiple users, clients and colleagues." The difference between the skills students thought the project required and those they already possessed suggests that the live projects provided a unique opportunity for many to learn new team-working and interpersonal skills.

However, when asked what new knowledge they actually acquired through undertaking the projects the responses were quite diverse. Knowledge of urban analysis or town planning principles was clearly new for most, but other more practical skills also were emphasised: "Participatory design tools and techniques"; "I learnt a lot of presentation techniques"; and "I learned new presentation skills in a non-technical way to communicate with common people." Only half of the interviewees mentioned knowledge derived from collaboration and teamwork: "I learnt the value of friendly interaction to work more efficiently"; "How to work in a team was new knowledge for me"; and "How to work with tutors effectively." Significantly, no one mentioned knowledge acquired from interaction with clients or the public, which all students felt was narrowly focused on achieving precise, realistic goals. Coming from a previous educational environment that promoted

professional socialization, it may have been a revelation to find intelligent people on the street able to strongly articulate different, yet valid, 'other' views. While it is clear that students recognised the need to develop good communication skills to interact with clients and the general public, such skills were perceived as outside the sphere of their discipline or academia as a whole and, therefore, not perceived as 'knowledge'.

When commenting on how the learning experience was different from previous learning experiences, many students again emphasised their involvement in new practical activities. Frequent reference was made to the participatory design process itself: "Participatory design as a technique was quite different learning from previous learning" and "Learning was mostly outside the studio and involved 'abnormal' activities beyond previous experience, e.g. cold calling and surveys." Others stressed new presentation techniques such as, "I learnt how to physically put up an exhibition which I didn't know earlier on." But hidden within the responses are a small number of comments that hint at learning with wider applicability or transferability (Bridges, 1993). One interviewee said the experience "showed situations from different points of view"; another said it allowed him to "gain broader knowledge than in the classroom." Still others mentioned that it led to "more involvement or engagement" and "more perspectives developed." This indicates that new cognitive or social learning emerged for some students, which others either didn't experience or found difficult to articulate. Or perhaps architecture students are fundamentally 'task-oriented' in that they have a strong project or assignment focus (either from self-selection or inculcation), and it does not occur to them to consider the acquisition of transferable skills as 'learning' in projects of this kind.

This is doubtful since one of the more interesting outcomes of the study was the mismatch between the students' expected and perceived learning outcomes. When asked to comment on the main thing they learned, all interviewees highlighted transferable skills or knowledge rather than the discipline specific, practical skills they expected to learn: "Understanding the difference between my own personal opinion and the views of the public"; "How to meet deadlines"; "How to relate wider issues to smaller things"; and "To do things with a wider perspective." A 'broadening of perspectives' was reported by most students, and was also reported particularly enthusiastically. It was clearly a highly valued and an unexpected learning outcome.

Although all students in this study adapted to the challenges of live projects, their interpretations of the value of the experience and their ability to describe the learning acquired varied considerably.

This probably reflects differences in prior knowledge, their own preferred learning styles, what they thought was relevant to learn, or even the effectiveness of group dynamics. In general responses tended to emphasise three aspects - what they found challenging, for example, teamwork and interacting with the public; what they thought had practical value, such as the development of CAD skills, model-making or urban design; and what was most enlightening, for example, the broadening of attitudes.

Yet it is clear that many of the students seemed confused about the meaning of the terms 'learning' and 'knowledge'. It appears that learning acquired through project work outside the classroom was equated more with the notion of 'skill' and they may have felt intuitively that skills are concerned with practical competence or capability. Because skills are acquired through observation or practice, mostly outside academia as part of everyday life, they do not categorise them in the same way as academic knowledge. Learning through instruction from an expert is categorised as academic knowledge. For most of the students in this study, the notion of 'learning' was associated with such things as interpersonal skills, management skills, etc. As academics we tend to think of the transfer of skills as being from academia to other segments of life but, in fact, recognising the reverse is a key learning experience.

It is worth noting that findings in this study are compatible with conclusions reached by Robotham, who critically examined interviews as a tool for researching student learning. He observes that while interviews can result in a "richer picture" of students' learning than quantitative methods and should not be abandoned, potential benefits from using interviews depend upon the ability of students to recognise and communicate their learning processes. He found that "the majority of those interviewed were unable to articulate how they learn and relied on descriptive accounts of various activities associated with learning" (Robotham, 2004: 225).

Theorizing 'Live' Projects in Architectural Education

We would now like to consider what might be the most appropriate framework for understanding the nature of learning in live student projects. Experiential learning is recognised as problematic by many because the term has been applied to a wide variety of educational approaches and there is lack of agreement about the definition of the term 'experience' and the role of 'reflection' in learning. Moon claims that learning from experience outside the classroom is never a 'pure' activity; we may expect that all learners will come to a situation with some prior knowledge and experience or that some teach-

ing will underpin the activity of 'doing'. Thus, she says "it is not possible to predict exactly what 'experience' is being perceived by the learner" (Moon, 1999: 21-23). The experiential learning cycle also separates participation in an experience from internalized reflection on that experience. As Quay points out, "experience exists as a memory to be processed by reflection", so learning in experiential education may be seen as mechanistic rather than holistic and 'embedded' in the world (Quay, 2003:108).

As noted previously, experiential learning is associated with psychological constructivism and assumes that "knowledge is actively constructed in the human mind" (Richardson, 2003: 1625). We believe this is inadequate for understanding the learning acquired in live projects. What is needed is a learning theory that investigates the effect on learners of social interaction and the added value of shared or collective learning. The theory of situated learning is one alternative. Situated learning focuses on participation rather than experience and is concerned with "knowledge as it is found and developed socially in practical contexts" (Rømer, 2002: 233). Associated with the writings of Lave and Wenger on apprenticeship training, it is now recognised as a general theory of knowledge and learning (Lave and Wenger, 1991). These authors introduced the notion of 'legitimate peripheral participation' and argued that a learner is a participant in a 'community of practice'; by entering the community the learner's participation is recognized as legitimate. As a newcomer initial participation is peripheral, but eventually it expands to "full-participation in the sociocultural practices of a community" (Lave and Wenger, 1991: 29). As in live student projects, in situated learning the role of the teacher is decentred and learning becomes a "dynamic and complex interplay between learner(s) and context" in which "neither part can be defined fully without reference to the other" (Quay: 108). While this shifts the focus away from learning as an internalized process and recognizes that it is always context-dependent, situated learning is fundamentally a form of socialization as learners slowly acquire the practical knowledge as well as the values and norms of behaviour maintained by a group. Consequently, this theory cannot account for learning acquired in a variable learning environment characterized by unpredictable interaction with many different people.

Another category of learning, which seems to provide the best theoretical basis for proposing alternative pedagogies in architectural education, is collaborative or collective learning. "Collective or group learning can be defined as learning which is more than the sum of the individual learning of the members of the group..." (Jarvis, Holford and Griffin, 2003: 51). This is rooted in the larger post-positivist epistemological project known as social construction-

ism, which “places the locus of knowledge not in the minds of single individuals but in the collectivity” (Gergen quoted in McCarty and Schwandt, 2000: 56). Unlike situated learning, in which the practical context of a knowledge community pre-exists the participation of the learner and determines what is learned, in collaborative learning knowledge is ‘constructed’ in the social realm of discourse as meanings emerge through dialogue within a collaborative relationship. According to Peters and Armstrong, “the construction of knowledge within this relationship is joint knowledge construction ... it is more than and other than the individual experiences” (Peters and Armstrong, 1998: 76).

Collaborative learning theory assumes an active learner who participates in social learning by making sense of their context through a constructive process of cooperative conversation. “[Group] members don’t just talk with one another. They also talk into the group and from the group.” The result is the emergence of group meanings that are not the same as individual interpretations of what has been learned (Peters and Armstrong, 1998: 76). Palincsar and Herrenkohl stress that collaborative learning relies on students developing an ‘intersubjective attitude’ since “thinking is distributed among the members of the group” (Palincsar & Herrenkohl, 2002: 26). Further, if students enter a learning situation expecting a traditional ‘transmission’ educational approach, then the collaborative learning experience may be delayed or prevented (Peters and Armstrong, 1998: 82). The findings of the present study certainly found this to be true.

Conclusion

Our research suggests clear benefits may be gained from grounding the architectural curriculum in the practicality and immediacy of a live project. The participatory design projects reviewed here established learning environments centred on dialogue and required students not only to engage in collective conversations with colleagues to accomplish group tasks, but also to handle equally constructive dialogue involving unfamiliar attitudes or viewpoints held by clients or members of the public. The broadening of students’ awareness that ensued helps close the gap between the values of their future profession and those of the society they will serve. When questioned about the value of live projects compared with studio-based projects, most students agreed that ‘real life’ projects provided a more effective learning experience for architects. Only one appreciated the studio environment more because of the freedom it offered for creative expression.

We must conclude that it is within the social realm of discourse that significant learning emerges in live student projects and, therefore, collaborative learning theory provides the most valuable conceptual framework. The challenges, and indeed enjoyment, afforded by live projects impart practical, immediately applicable transferable skills, although clearly further work is required to address the students’ failure to recognize those skills as knowledge. Further research also should be undertaken to analyze precise situations when group learning is constructed. Thus, user-centred or participatory design projects have distinctive pedagogic value and we advocate their use as a means of grounding architectural curricula which, hitherto, have favoured the traditional model of studio learning through hypothetical design projects.

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